Maryland Department of Natural Resources
Tidewater Administration

Analysis of White Perch By-Catch in Crab Bank Traps in Tributaries of Potomac River

FISHERIES TECHNICAL MEMORANDUM SERIES
NUMBER ONE
OCTOBER 1992

Paul G. Piavis
Edward J. Webb, III

The Maryland Department of Natural Resources, Tidewater Administration was contacted by a concerned citizen regarding the effects of white perch by-catch in crab bank traps in Potomac River. White perch are a very valuable fish species throughout the Chesapeake Bay region for recreational and commercial fishermen. The species os one of the most widespread and abundant fish species in the Chesapeake. White perch migrate to upper reaches of tidal streams in early spring, spawn, and return to the lower estuary in late spring. Larger perch tend to move downstream into more saline waters. Growth rates vary widely between rivers. In the Choptank River a five year old perch averaged 6.6 inches while in Trappe Creek, a tributary to Sinepuxent Bay, a five year old perch averaged 8.9 inches (Casey *et al* 1988).

Regulations for the Potomac River are promulgated by three different regulatory agencies: Potomac River Fish Commission, the State of Maryland, and the Commonwealth of Virginia. An interview with A. C. Carpenter, Executive Secretary of the Potomac River Fish Commission, indicated that the use of crab bank traps and the sale of by-catch are legal in both the Potomac River and the Virginia tributaries to the Potomac River. Similarly, Sgt. H. Dorsey (MD Natural Resources Police Potomac Region) confirmed that crab bank traps are legal gear in St. Mary's County and Somerset County, MD, and the sale of white perch captured in bank traps is legal as long as the fisherman is a licensed commercial fisherman and that gear limitations (size of twine and mesh) are obeyed.

Bank traps will capture both peelers and perch, but modifications to the gear may minimize by-catch of fish species. Stretched mesh >3 inches would decrease the amount of smaller sized white perch being gilled or captured, but increased mesh size would decrease the gear efficiency for peelers. Another method to reduce by-catch could be the incorporation of cull rings in the net to let undersized fish escape.

Population status of white perch in Maryland tributaries is difficult to determine. Commercial catch statistics show that white perch landings have fluctuated over the last decade, but the ability to discern population trends is hampered because a large amount of white perch are harvested as a by-catch of other directed fisheries. Generally, relative abundance measures derived from by-catch statistics are not truly indicative of population status and are not comparable year to year. With that said, we will look at landings to give us an idea of trends of adult stocks. Total landings of adult white perch from Potomac River (VA and MD combined) declined since 1980 (Figure 1). The decrease in landings is partially due to the decrease of gill-netting in response to the striped bass moratorium in Maryland and gear restrictions in the Potomac.

Potomac landings are a fraction of Chesapeake landings and continue to decrease (Figure 2). Landings from other systems in Maryland have also fluctuated over the last decade but have not declined as dramatically. White perch landings in Maryland decreased immediately after the moratorium on striped bass harvests

but have since picked up as fishermen have turned to pound nets and fyke nets to replace white perch losses from the tightly controlled gill net fishery. The Potomac white perch gill net fishery has disappeared and the catch has not been replaced by other gears (Table 1). It is difficult to determine what portion of the Potomac white perch decline is real and what portion is due to a change in fishing practices.

It is difficult to ascribe the reduction in white perch (as reflected in the commercial landings) to the use or overfishing of a single commercial gear. The majority of white perch landings in Potomac River occur early in the year before bank traps are commonly set (Figure 3). Approximately 94% of the white perch captured in the Potomac River tributaries were harvested during the period October through March. The tributaries in Maryland also produced less than 2000 reported pounds of white perch in 1991.

The use of bank traps, restricted to St. Mary's Co. in the Potomac drainage, would not threaten the population because of substantial mixing of the Potomac River stock. Mulligan and Chapman (1989) found three distinct white perch stocks in the Chesapeake Bay region, but mixing within these systems occurs. The similar trends in white perch landings in Potomac River and Chesapeake Bay and the timing of bank trap use suggest that harvest practices in the Potomac River are not having extraordinary influence on population dynamics.

Annual levels of reproduction for white perch and several other fish species are determined with Maryland's juvenile finfish

survey. Since 1958, the white perch juvenile index in Potomac River averaged 23.6 juvenile white perch per standardized seine haul compared to 21.4 juvenile perch per haul from all systems in Chesapeake Bay, combined. Nanticoke River had a white perch juvenile index of 25 over the same time period. The juvenile index from Potomac River fell to 8.3 during the period 1980-1989, compared to 15.5 for the bay-wide survey. The trend evidenced by the juvenile survey in Potomac River is closely related to trends in Choptank River, Nanticoke River, and upper Chesapeake Bay (Figures 4-7) which suggests that white perch reproduction is influenced by similar factors such as environmental variables.

Department of Natural Resources personnel conducted trawl and seine surveys in Mattawoman Creek and Wicomico River during 1989-1991 (Table 3). Relative abundance estimates of juvenile white perch are much greater in Mattawoman Creek than Wicomico River (up to 100X greater), but several factors may account for this difference. Water quality may be different between rivers which makes Mattawoman Creek a more suitable nursery area than Wicomico River. DNR Tidal Fisheries will make an examination of existing data to try to determine reasons for the difference. Magnitude of catches of white perch 1+ and older in seine and bottom trawls and trends in abundance were similar between systems, but catches of non-juvenile white perch were consistently greater in Mattawoman Creek than Wicomico River. In both river systems, relative abundance of older white perch increased during 1989-1991. In both surveys, an increase in juvenile abundance in 1990 was followed by

an increase in 1+ white perch in 1991. These data suggest that year-class abundance is set before the juvenile sampling period (Jul- Sep). It is impossible to rigorously test such a hypothesis without age specific data and with such a limited database, but these preliminary findings suggest that juvenile abundance may be a good indication of year-class strength (Casey *et al.* 1988). If year-class strength is important for white perch population dynamics, as it is for striped bass and yellow perch, our data indicate that the 1989 and 1991 year-classes are strong year-classes in Potomac River tributaries and should show up in increased catchable white perch in 1993.

Trawl surveys and data from other DNR projects indicate that white perch can sustain high levels of fishing pressure and that in many instances, white perch populations may actually benefit from the liberal removal of smaller white perch (6-8 inches) to increase population growth rate (Rothschild *et al.* 1991). Preliminary estimates from Potomac River indicate that annual fishing mortality rate is 18% and 23% for male and female white perch, respectively (Rothschild *et al.* 1991). The Potomac River fishing mortality rate is intermediate compared to other systems in Chesapeake Bay (Table 1). Casey *et al.* (1988) studied white perch in Choptank River. They found that white perch total annual mortality rate was 15%, but mortality was higher for 10 to 15 year old white perch than 5 to 10 year old white perch. These mortality rates are considerably lower than many other fish species. Atlantic menhaden, a commercially harvested stock, maintain population levels at fishing

mortalities of 63%. Yellow perch in the upper Chesapeake Bay have mortality rates of 56%. Spanish mackerel fishing mortalities are 23%, but these harvest levels are considered moderate. Setzler-Hamilton (1991) stated that despite declines in landings, white perch are not over-exploited in Chesapeake Bay.

The use of bank traps for collection of white perch as a by-catch is not, by itself, illegal. Regulations specific to a particular region or river should be consulted. White perch populations have been shown to be fairly resilient to large removals by commercial and recreational fisheries. Based on similar trends between Potomac River white perch catches (juvenile and adult) and Chesapeake Bay white perch catches, the suspected level of the white perch by-catch in the Potomac River is not sufficient to negatively impact population status.

Table 1. White perch annual total mortality (% x yr^{-1}) and annual fishing mortality (% x yr^{-1}) estimated from Rothschild *et al.* (1991) for several regions of Chesapeake Bay.

River	Sex	Total Mortality	Fishing Mortality
Choptank	Pooled	30.3	15.4
Nanticoke	Pooled	49.0	36.0
Upper Bay	Pooled	30.9	19.0
Potomac	Male	45.8	18.0
	Female	34.0	23.0
Patuxent	Male	37.7	29.0
	Female	30.2	7.8

TABLE 2. POTOMAC RIVER FISHERIES COMMISSION
COMMERCIAL WHITE PERCH LANDINGS IN POUNDS
1976 thru 1991

February 7, 1992

YEAR	GILL NET	POUND NET	HOOK & LINE	FISH POT	FYKE NET	BAIT POT	HAUL SEINE
1976	28,896	24,867	0	2,148	1,590	0	2,929
1977	47,472	36,264	0	2,270	6,662	0	2,354
1978	98,057	75,635	0	12,444	2,073	0	3,580
1979	30,556	44,208	0	389	2,721	0	953
1980	130,366	38,542	0	940	2,922	0	10
1981	92,402	19,457	0	795	6,359	0	0
1982	46,887	26,494	0	529	539	0	3,564
Total	474,636	265,467	0	19,515	22,866	0	13,390
Avg.	67,805	37,924	0	2,788	3,267	0	1,913
%	59.64	33.36		2.45	2.87		1.68

Average annual landings (76-82) 113,696 - w/o Gill Net 45,891

1983	19,698	21,882	5	399	1,006	11,728	14,068
1984	10,106	17,166	278	412	0	45,039	2,524
1985	0	39,501	586	33	2,019	20,983	82
1986	0	39,734	156	0	2,601	8,705	0
1987	0	13,197	246	1,171	1,680	10,355	1,460
1988	0	22,648	146	280	698	7,561	0
1989	0	17,593	921	0	699	3,716	3,983
1990	1	19,675	448	716	372	4,551	0
1991	0	5,924	216	643	406	6,276	2
Total	29,805	197,320	3,002	3,654	9,481	118,914	22,119
Avg.	3,312	21,924	334	406	1,053	13,213	2,458
%	7.76	51.35	0.78	0.95	2.47	30.94	5.76

Average annual landings (83-91) 42,700 - w/o Gill Net 39,388

COMMERCIAL WHITE PERCH IN POUNDS BY YEAR
1964-1991

YEAR	POUNDS	YEAR	POUNDS
1964	82,658	1978	185,617
1965	112,420	1979	77,999
1966	213,541	1980	175,771
1967	151,137	1981	119,013
1968	208,725	1982	78,034
1969	317,919	1983	82,293
1970	215,350	1984	75,525
1971	126,163	1985	62,842
1972	80,942	1986	51,196
1973	63,508	1987	28,109
1974	36,911	1988	31,335
1975	44,738	1989	26,912
1976	64,441	1990	25,763
1977	103,331	1991	13,467

High 317,919 (1969)
Low 13,468 (1991)
Average 101,988

28 YEARS OF RECORDS

Table 3. Relative abundance estimates of juvenile and non-juvenile white perch in Mattawoman Creek and Wicomico River, 1989-1991. CPE=catch per standardized seine haul or trawl.

Mattawoman Creek

	Juvenile CPE	Non-juvenile CPE
Bottom Trawl		
1989	6.7	0.5
1990	39.3	4.3
1991	12.0	5.2
Seine		
1989	32.0	13.9
1990	61.8	10.5
1991	44.0	26.4

Wicomico River

Bottom trawl		
1989	0	0.6
1990	0.1	1.2
1991	not sampled	not sampled
Seine		
1989	0.4	8.6
1990	0.6	1.7
1991	2.4	2.3

Figure 1.

WHITE PERCH LANDINGS FROM POTOMAC RIVER, 1970-1991

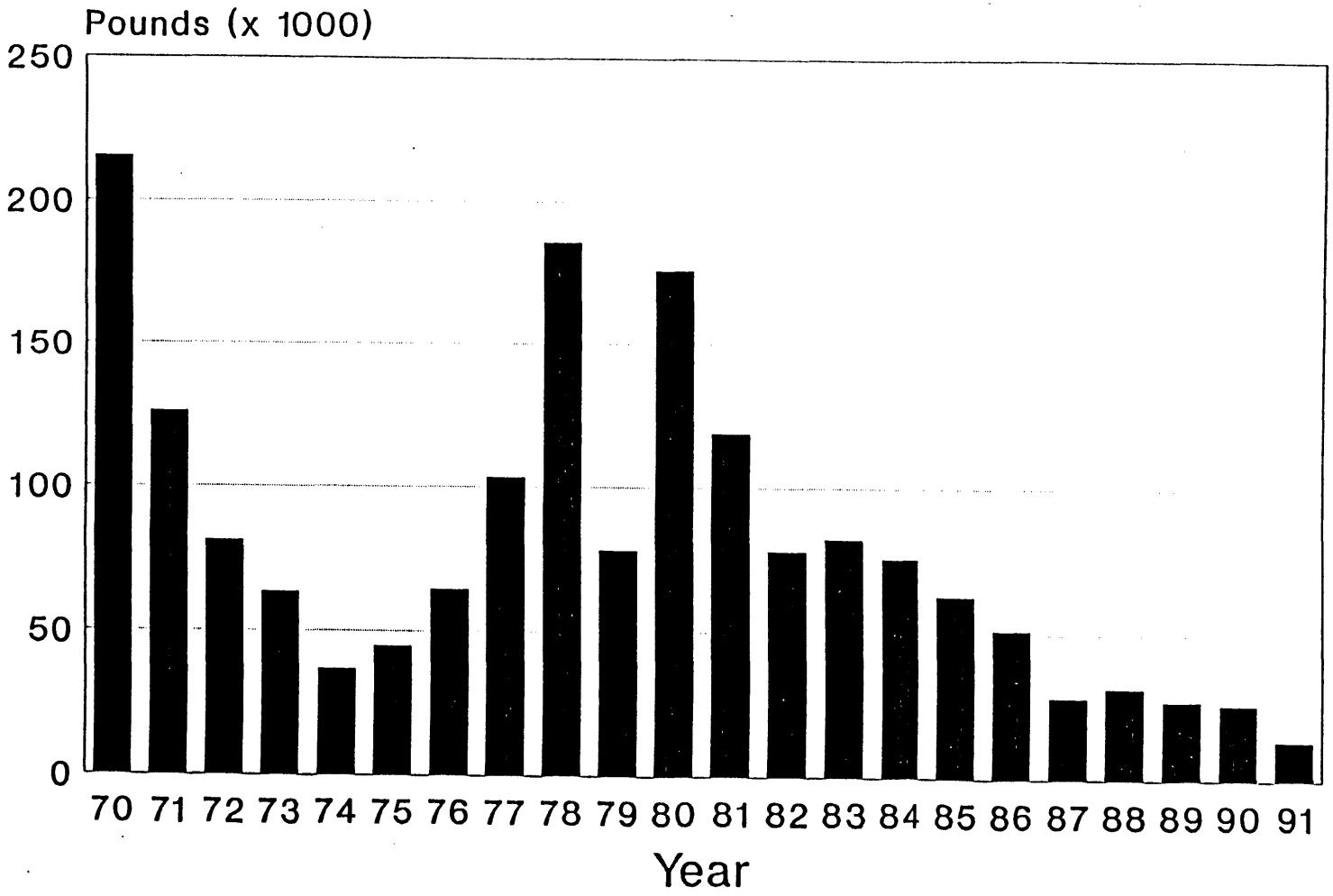


Figure 2.

Potomac River White Perch Landings as a Percentage of Total Landings in Maryland

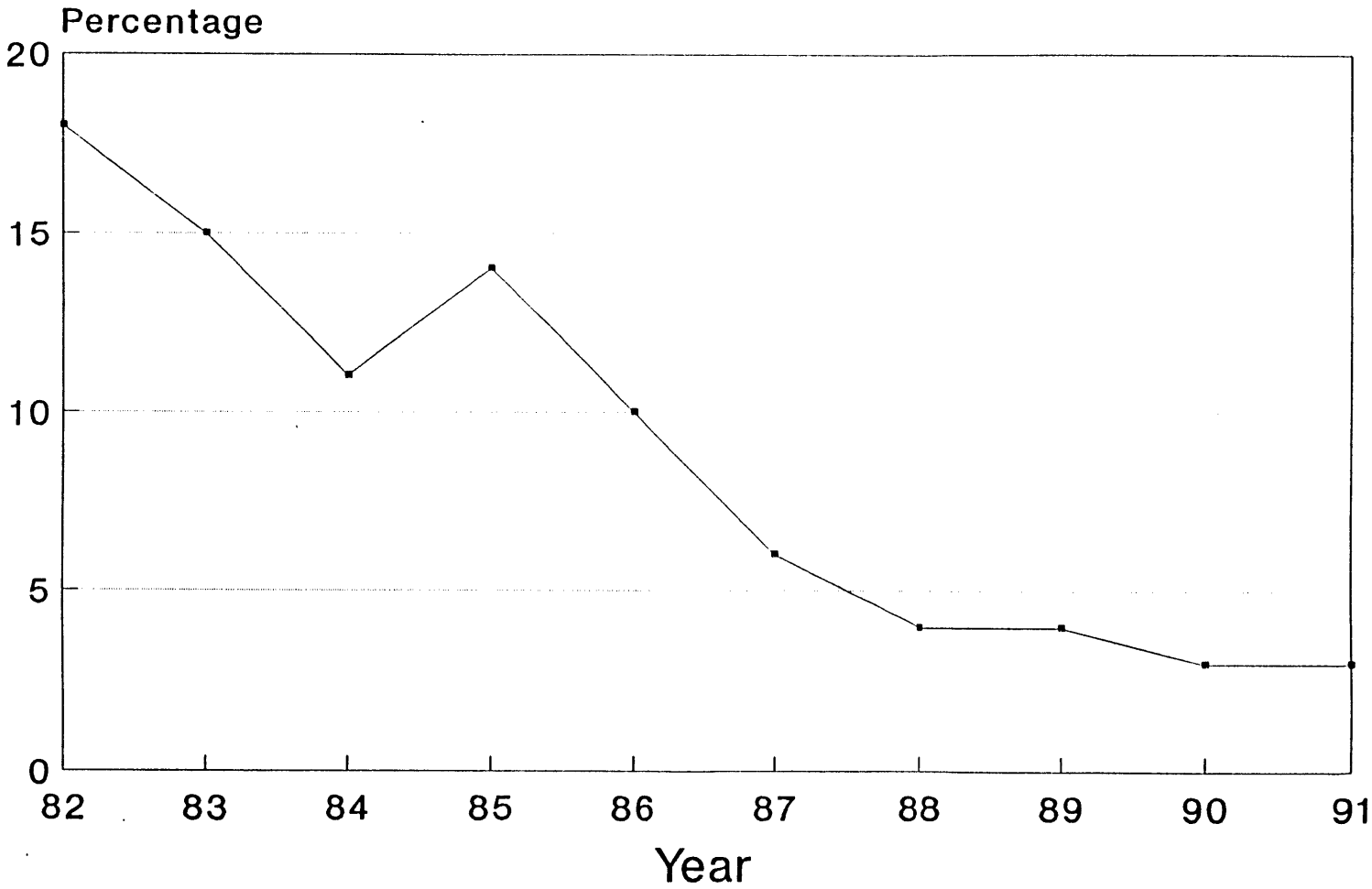


Figure 3.

Monthly White Perch Landings from Potomac River Tributaries, 1991.

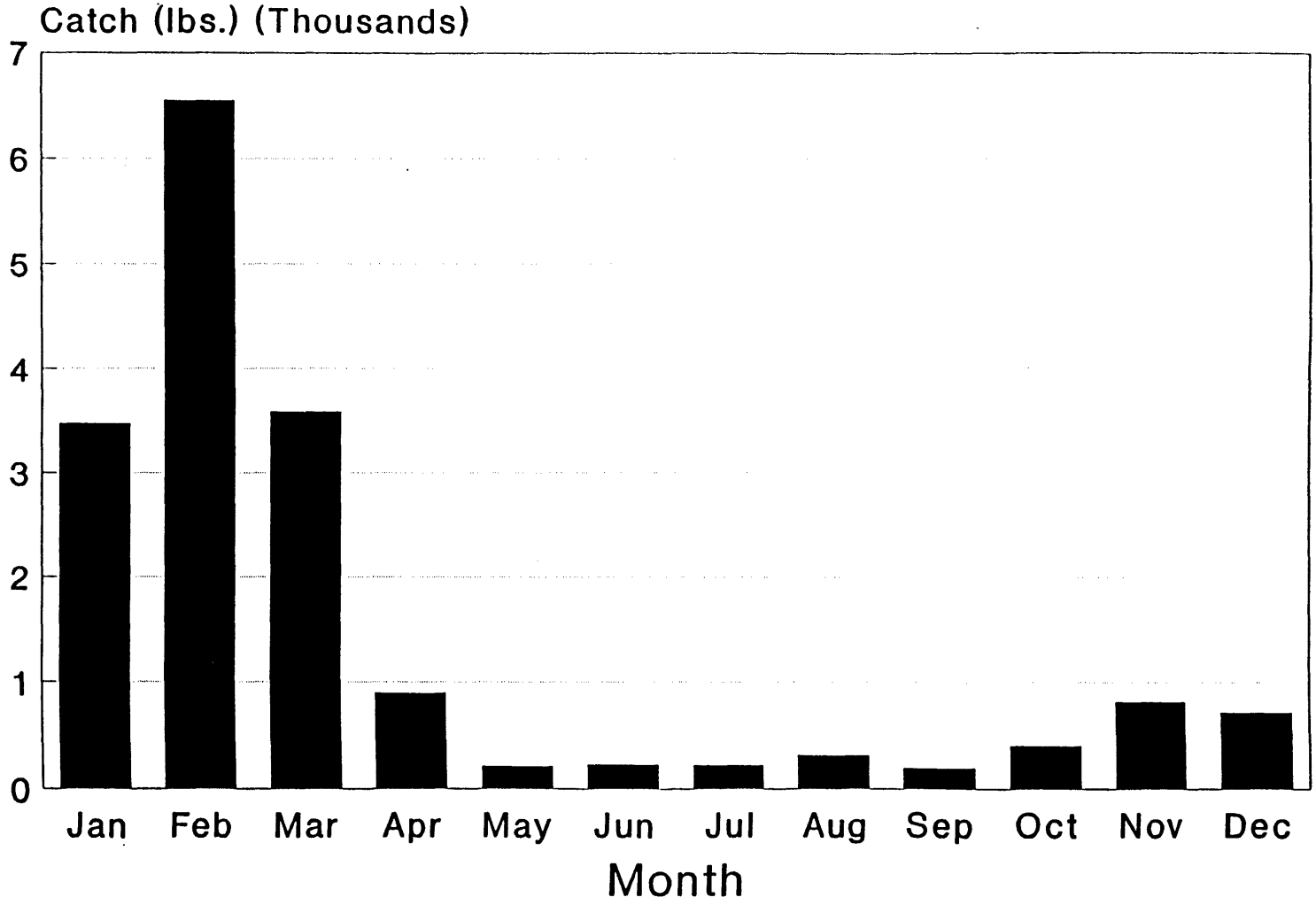


Figure 4.

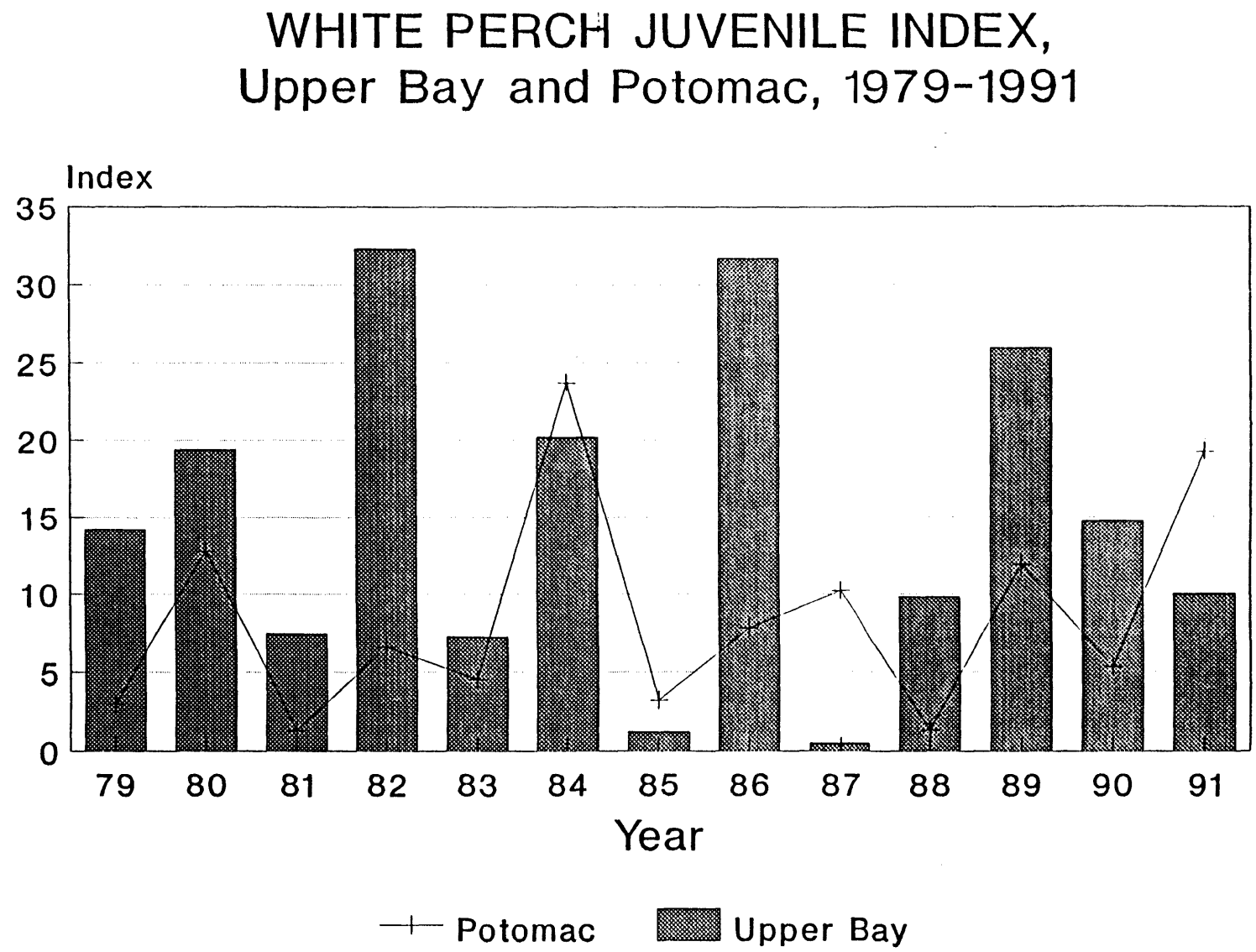

WHITE PERCH JUVENILE INDEX,
Upper Bay and Potomac, 1979-1991
Index
35
30
25
20
15
10
5
0
79
80
81
82
83
84
85
86
87
88
89
90
91
Year
Potomac
Upper Bay

Figure 5.

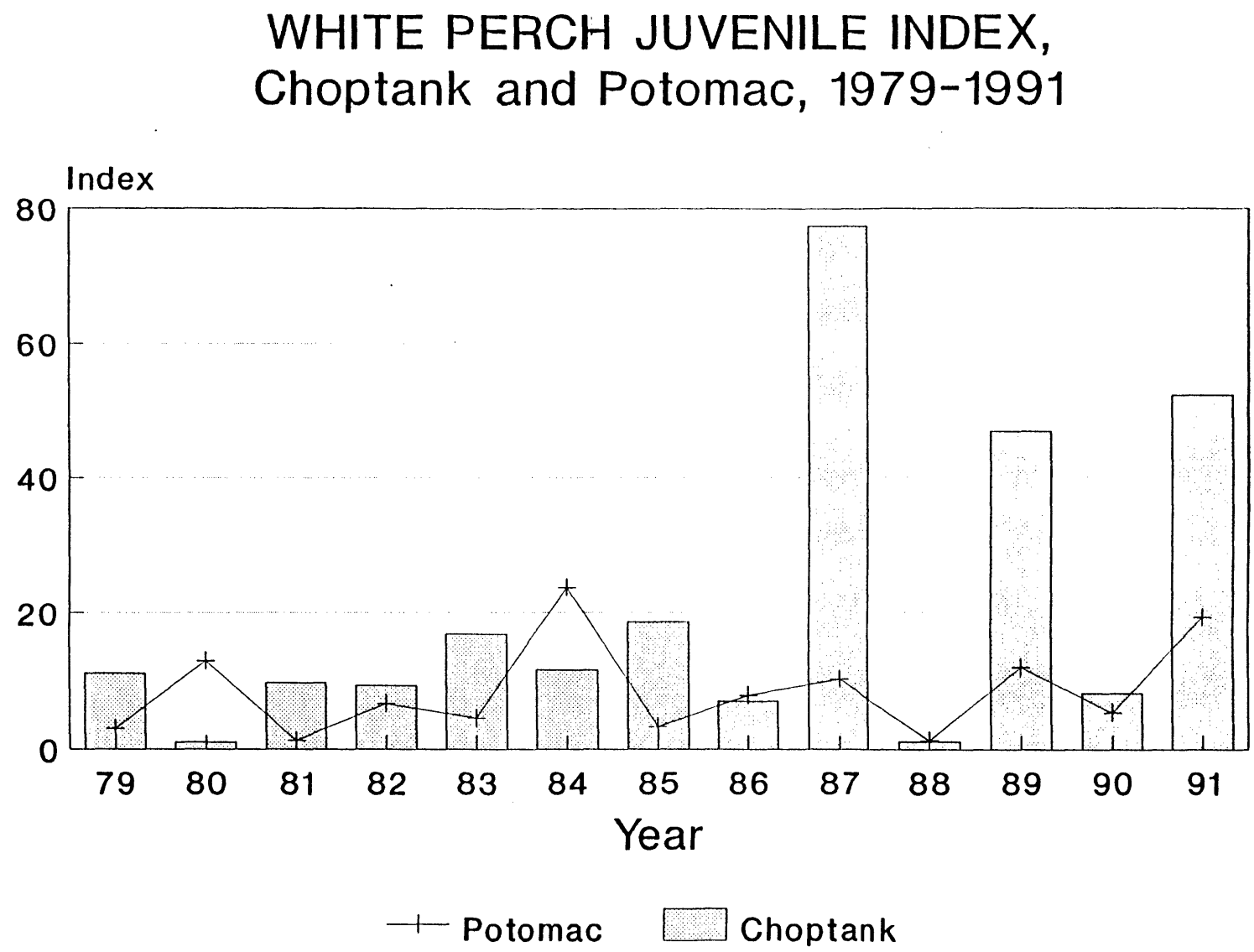

WHITE PERCH JUVENILE INDEX,
Choptank and Potomac, 1979-1991
Index
80
60
40
20
0
79
80
81
82
83
84
85
86
87
88
89
90
91
Year
Potomac
Choptank

Figure 6.

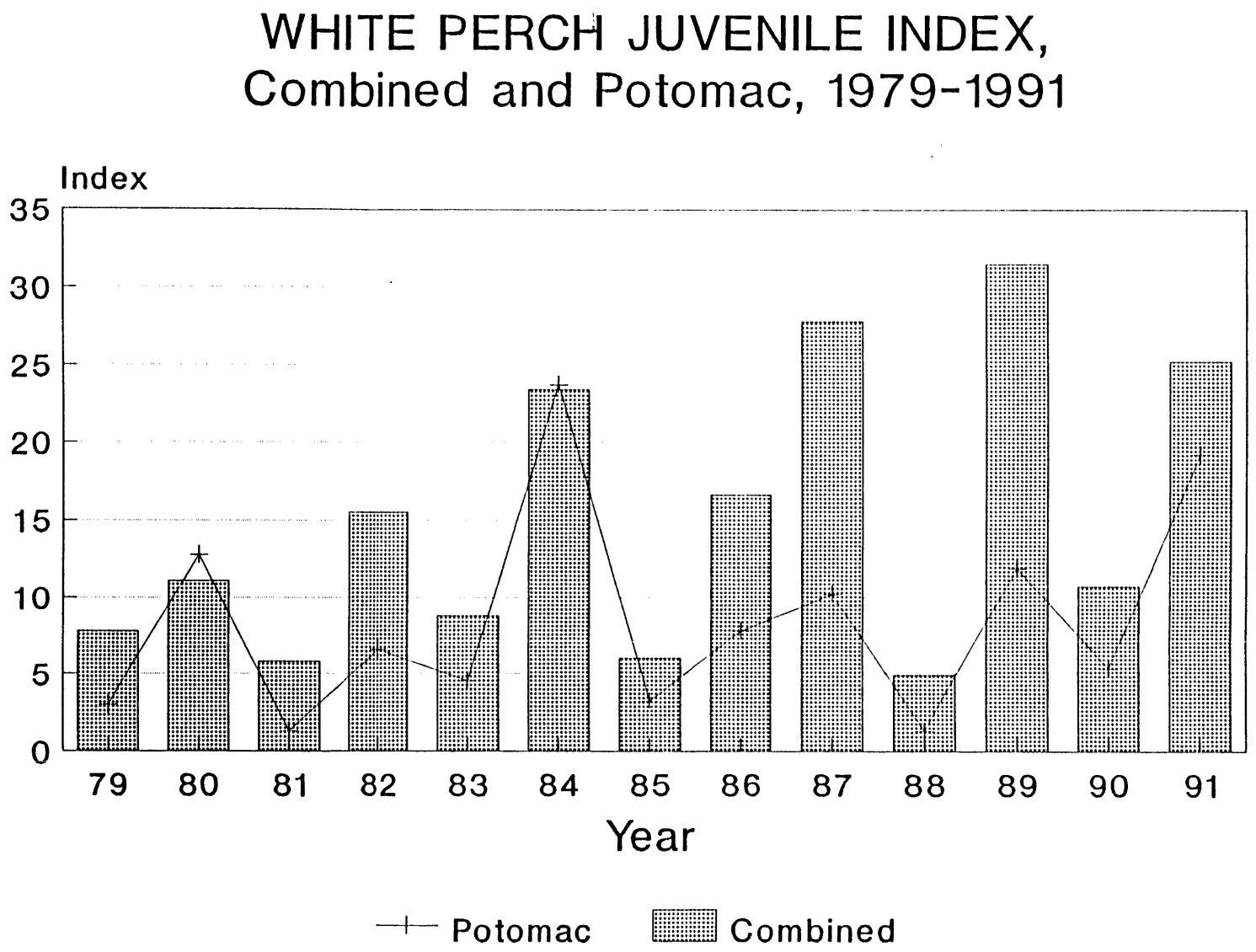
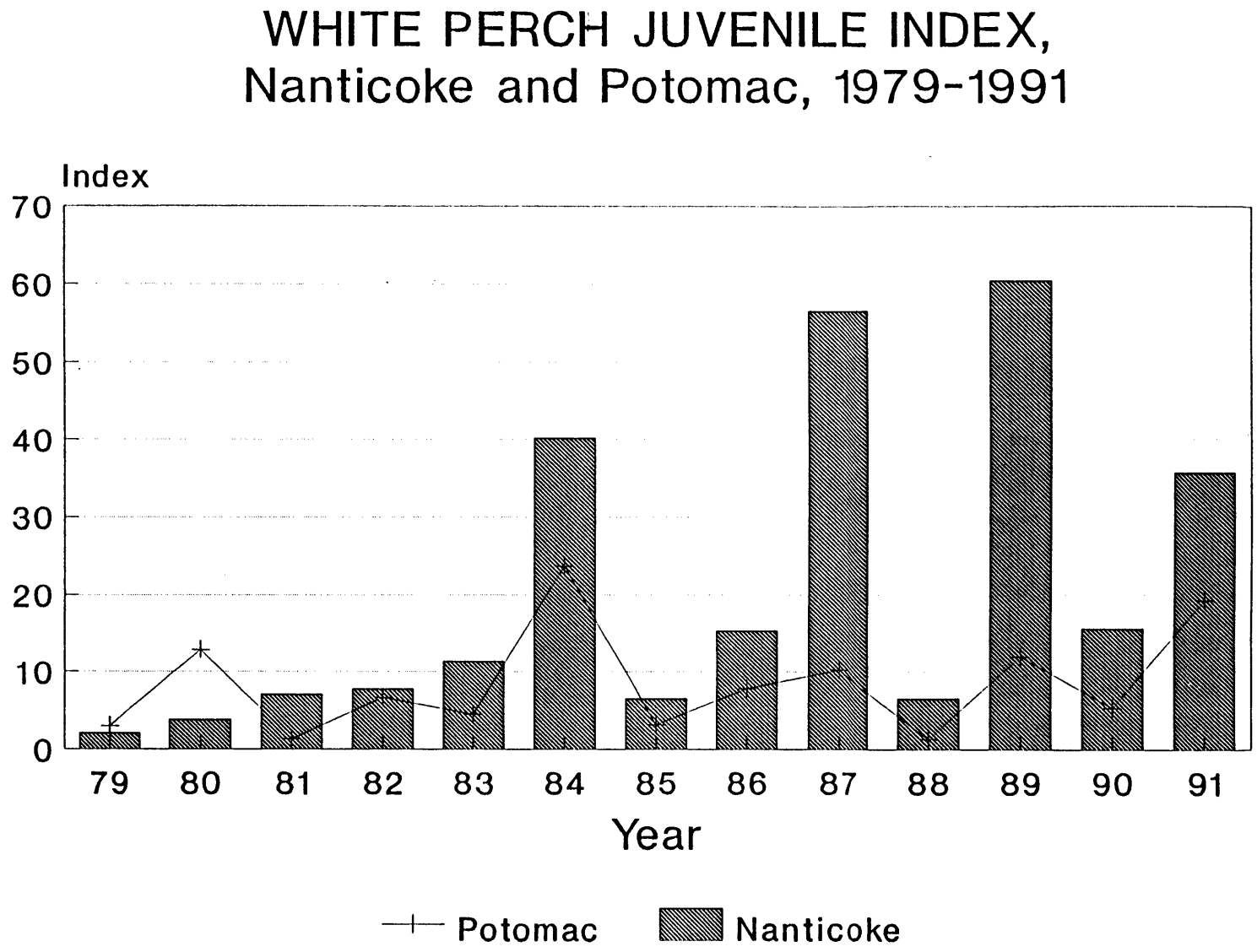

WHITE PERCH JUVENILE INDEX,
Combined and Potomac, 1979-1991
Index
35
30
25
20
15
10
5
0
79
80
81
82
83
84
85
86
87
88
89
90
91
Year
Potomac
Combined

Figure 7.


WHITE PERCH JUVENILE INDEX,
Nanticoke and Potomac, 1979-1991
Index
70
60
50
40
30
20
10
0
79
80
81
82
83
84
85
86
87
88
89
90
91
Year
Potomac
Nanticoke

LITERATURE CITED

Casey, J.F., S. Minkkinen, and J. Soldo. 1988. Characterization of Choptank River populations of white (*Morone americana*) and yellow (*Perca flavescens*) perch. MD Dept. Nat. Res. Tidewater Admin. Rept.

Mulligan, T.J. and R. Chapman. 1989. Mitochondrial DNA analysis of Chesapeake Bay white perch, *Morone americana*. Copeia 1989:679-688.

Rothschild, B., J. Ault, G. DiNardo, C. Zhang, B. Huang, L. Baylis, H. Li. 1991. Program development for efficient fish sampling and stock assessment in the northern Chesapeake Bay. Final Report to MD Dept. Nat. Res. Contract No. CB-001-003.

Setzler-Hamilton, E.M. 1991. White Perch. *In:* Habitat requirements for Chesapeake Bay living resources. S. Funderburk, S. Jordan, J. Mihursky, and D. Riley, eds. U.S. EPA Chesapeake Bay Program.